DOCUMENT RESUME

ED 078 607 EC 052 049

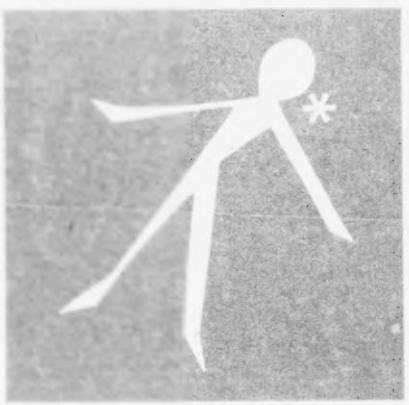
AUTHOR	Oldsen, Carl F.; Vinsonhaler, John F.
TITLE	Regional Information Centers: A Frontier in Small Library Automation. Dissemination Document No. 12.
INSTITUTION	Michigan State Univ., East Lansing. Regional Instructional Materials Center for Handicapped Children and Youth.
SPONS AGENCY	Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
PUB DATE	[68]
NOTE	26p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Abstracts; Computer Programs; *Computers; *Exceptional Child Education; Handicapped Children; *Information Centers; *Information Systems; *Libraries

ABSTRACT

The regional information center is examined as an instrument for innovation in small library automation and as a basis for the evolution of national information systems. Summarized is development of regional information centers in education, including centers specially for handicapped children, and indicated are trends toward national information networks. A case study of regional library automation is described according to the manner in which local libraries may be generated to aid in the development of computer based national information systems. Two major characteristics are emphasized: standardized procedures for abstracting and indexing; and generalized (machine independent) computer programs permitting the use of local computer facilities with the option of linking with other regional or national computer installations. Conclusions are drawn with respect to the computer support required by regional information centers attempting to work toward small library automation and national library development, utilizing networks of computer based regional libraries. (For related information, see EC 052 048 and EC 052 050). (Author/MC)

FILMED FROM BEST AVAILABLE COPY

ED 078607



USOE MSU
REGIONAL
INSTRUCTIONAL
MATERIALS
CENTER FOR
HANDICAPPED
CHILDREN
AND YOUTH

REGIONAL INFORMATION CENTERS: A FRONTIER IN SMALL LIBRARY AUTOMATION

Dissemination Document No. 12

EXAMINATION COPY

Cooperating with State Departments of Education — Michigan-Indiana-Ohio
Model Instructional Materials Network for Handicapped Children and Youth
U.S. Office of Education — Bureau of Education for the Handicapped

EC 052 049

ED 078607

REGIONAL INFORMATION CENTERS: A FRONTIER IN SMALL LIBRARY AUTOMATION

by Carl F. Oldsen
Librarian
USOE/MSU Regional Instructional
Materials Center for Handicapped
Children & Youth

and

Dr. John F. Vinsonhaler
Research Design Consultant
for Information Retrieval
Michigan State University
East Lansing, Michigan

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

The work presented herein was performed pursuant to a Grant from the U.S. Office of Education, Department of Health, Education and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Office of Education, and no official endorsement by the U.S. Office of Education should be inferred.

*Member Instructional Materials Network for Handicapped Children and Youth
U.S. Office of Education – Bureau of Education for the Handicapped

REGIONAL INFORMATION CENTERS: A FRONTIER IN SMALL LIBRARY AUTOMATION

Presented at the Fifth National Colloquium on Information Retrieval

Copies of the proceedings may be obtained from:
Thompson Book Co., 383 National Press Bldg., Washington, D.C. 20004

ABSTRACT

The present report examines the regional information center as an instrument for innovation in small library automation and as a basis for the evolution of national information systems. **First,** the development of regional information centers in education is summarized and trends toward national information networks are indicated. **Second,** a case study of regional library automation is described to indicate the manner in which local libraries may be generated to aid in the development of computer based national information systems. Two major characteristics are emphasized: standardized procedures for abstracting and indexing; and generalized (machine independent) computer programs permitting the use of local computer facilities with the option of linking with other regional or national computer installations. **Third,** conclusions are drawn with respect to the computer support required by regional information centers attempting to work toward small library automation and national library development, utilizing networks of computer based regional libraries. One problem appears to be the continuing tendency of university computer centers to place major emphasis upon numerical computation at the expense of information processing.

INTRODUCTION

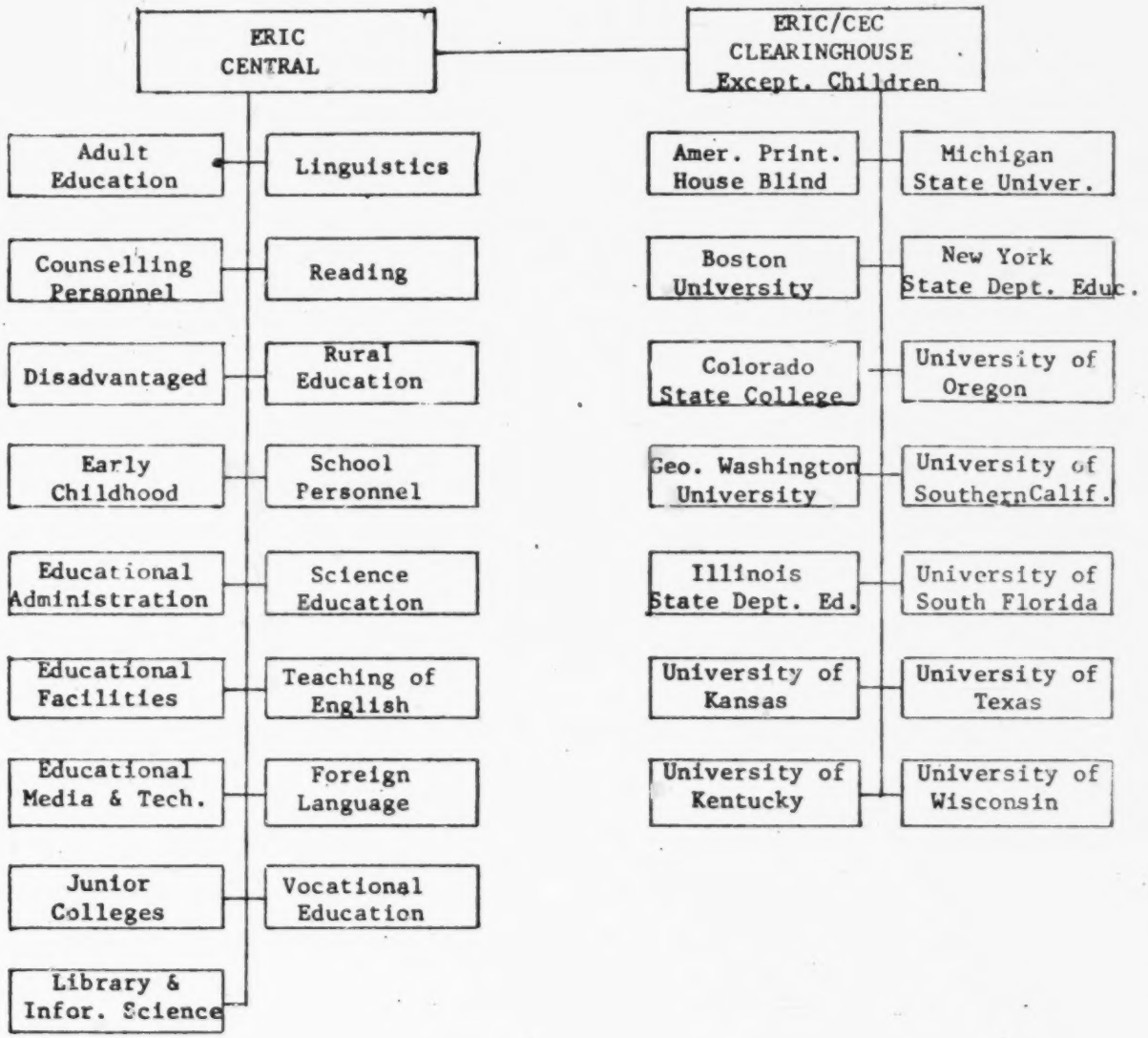
The rapid growth of specialized regional libraries has been due in major part to the impetus of large amounts of federal support. In education, for example, the federal government has recently established two major networks of small regional libraries. One such regional library network is the Educational Resources Information Center Clearinghouses (ERIC), set up by the U.S. Office of Education. The other major network set up by the U.S. Office is the Instructional Materials Centers for Handicapped Children and Youth. Figure 1 shows these major educational networks and their channels of communication.

The ERIC network includes 18 Clearinghouses. Each Clearinghouse emphasizes a special area of resources for education. The Council for Exceptional Children Clearinghouse emphasizes resources for the education of children with special learning problems.[1] Each clearinghouse contributes materials to ERIC Central at Washington, D.C.

The present Office of Education sponsored Instructional Materials Center network includes a total of 14 IMC's located throughout the United States. With several exceptions, each of the IMC's was planned to serve teachers and administrators of all types of handicapped children and youth in a region comprised of several states.

The special import of the figure is that it shows the linkage developing between the ERIC network and the IMC network. The major channel of communication is through the two capping agencies: the CEC Clearinghouse and ERIC Central. Each ERIC Clearinghouse contributes information in the form of abstracts to ERIC Central. Similarly, each local IMC or regional library contributes abstracts to the ERIC Clearinghouse for Exceptional Children. Finally, the CEC Clearinghouse exchanges abstracts with ERIC Central, forming

Figure 1. Major Networks of Educational Regional Libraries.



ERIC Clearinghouse Network

Instructional Material Centers Network

a communication link between the two networks. Thus, the IMC's taken together with the CEC Clearinghouse form a network of educational information storage and retrieval centers. Each local IMC or Clearinghouse can make use of its local facilities and yet be a part of the larger network. By utilizing uniform input procedures of bibliographic information, each center can draw upon the resources of the other IMC's or the Central Clearinghouse, and through it, the entire resources of the ERIC Clearinghouse network.

These new localized information centers offer a fertile ground for the development of automated libraries. Document collections tend to be fairly small, e.g., less than 10,000 documents. Further, the capping agencies tend to encourage the use of computers and library automation procedures. While the local IMC's and Clearinghouses are free to develop their own procedures, cooperation is encouraged since standardized input formats, etc., are necessary to the use of central files. Such exisitng regional library networks could also provide a basis for the evolution of national automated information systems. Experience indicates that two major characteristics will determine the eventual role of regional libraries in the development of national systems. First, the local libraries must be able to use local computer facilities for automation. This characteristic is required if the library is to achieve its primary objective of serving the needs of a geographical region. Second, the libraries must be as independent as possible of particular machines and computer installations. This characteristic is required for the development of sufficient standardization to permit the integration of local centers in a national information system. Both characteristics require the development of computer programming systems and abstract collections which are portable, in the sense that they can be exchanged among the local information centers.

To clarify these points about the local regional library as a frontier for library automation and the evolution of national information systems, let

us examine in detail the experiences of a particular Instructional Materials Center, which has attempted automation by means of a portable set of programs and abstract collections.

A CASE STUDY IN REGIONAL LIBRARY AUTOMATION

The regional library we shall consider is the Instructional Materials Center for Handicapped Children and Youth in the College of Education at Michigan State University. The Center offers listings of the available materials as well as abstracted information regarding such materials as curriculum adaptations and additions, curriculum guides, research studies, special teaching aides, and professional literature. Information is made available through a computer-based information retrieval system.

The automation of the library is performed through the use of a system of FORTRAN programs for information retrieval, previously developed in cooperation with another federal project. This system, known as the Basic Indexing and Retrieval System (BIRS 2.0), is designed to be used in much the same way as the Generalized Information System proposed by IBM. The system was developed in such a way as to be maximally machine independent and adaptable to use in small libraries for the production of abstract catalogs, with indexes, and for automated searching by relatively untrained personnel. Table 1 lists the programs in the current version of the system.

Figure 2 summarizes the relationship of the system to the work of the IMC. As shown in the figure, BIRS is used to automate the retrieval functions of the IMC. Thus, the system is used to store abstracts, generate indexes and prepare a library catalog (containing abstracts for current IMC holdings, with author/title and subject indexes) and finally to support a reference searching service (permitting users to query the IMC abstract file for materials relevant to particular needs). In the present case, BIRS was

TABLE 1. Component Programs of the Basic Indexing and Retrieval System (BIRS 2.0)

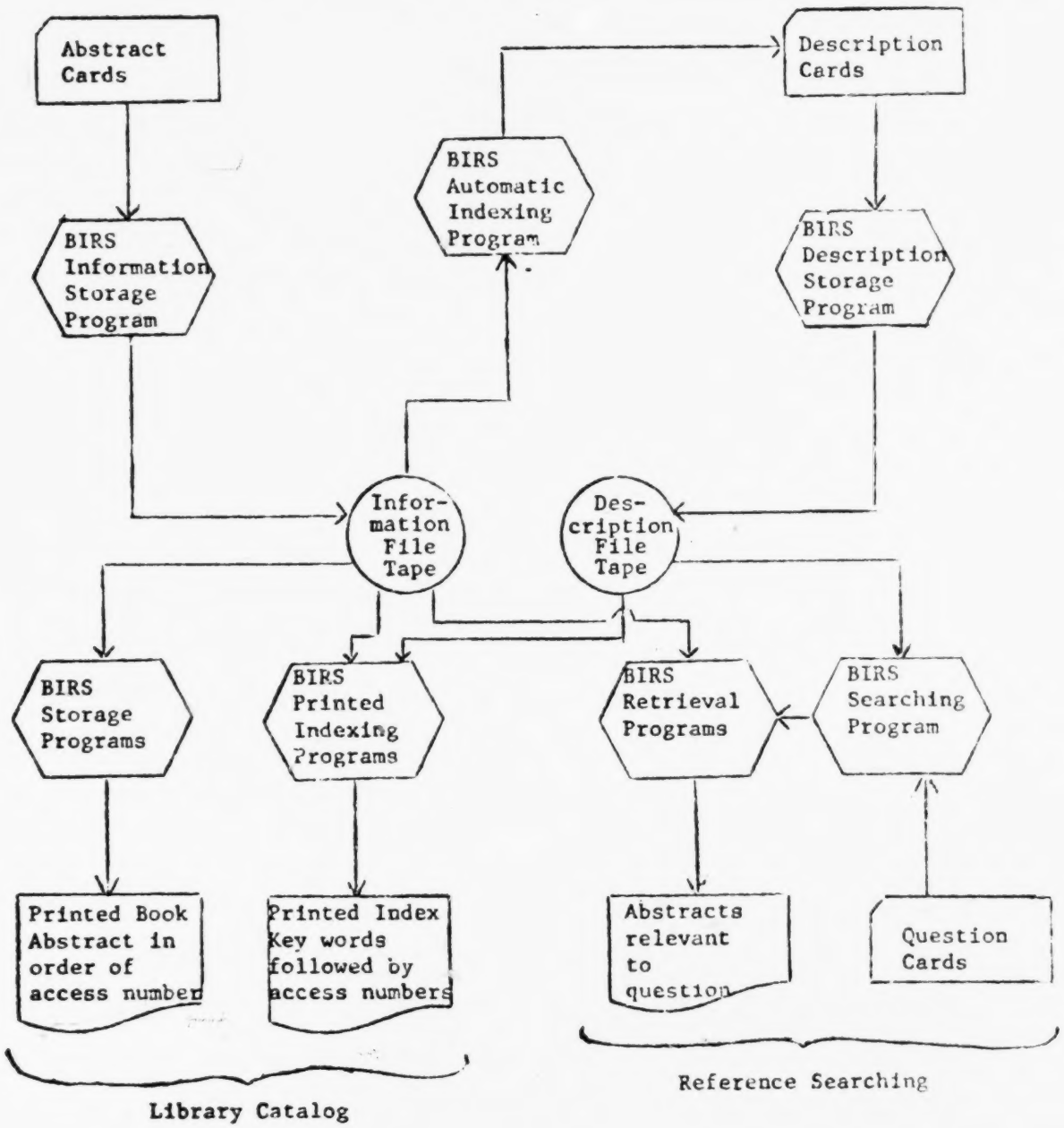
FUNDAMENTAL IR OPERATION	COMPONENT PROGRAM	FUNCTIONS OF COMPONENT PROGRAM
Executive	EXEC	The Executive Program is designed to store and retrieve component programs comprising BIRS.
Information Storage	IFMP	The Information File Maintenance Program is designed to read informational elements* from cards, assign a unique access number to each element, and store the element on the Information File Tape (IFT), so that the element may be retrieved, given its access number.
Information Indexing (Descriptive Analysis)	DAP	The Descriptive Analysis Program is designed to aid the user with the task of indexing or classifying informational elements. In general, DAP reads informational elements either from the IFT or from cards and searches them for key words. Thus, DAP may be used either to perform a word frequency analysis or to automatically index informational elements
	FAP	The File Analysis Program is a highly generalized content analysis program which operates on natural language text. FAP performs the same operations as DAP in the indexing process.
Information Indexing (Description File Maintenance)	DFMP	The Descriptive File Maintenance Program is designed to read descriptions (i.e., sets of indexing terms) and access numbers of informational elements from cards and store them on the Description File Tape (DFT) to provide an index to the contents of the Information File Tape (IFT). The user may manually generate the card input for the DFMP, or use either the IFMP or the DAP, to aid him with this task.
Information Indexing (Printed Indexing)	PIP	The Printed Indexing Program is designed to prepare a traditional author or subject index using informational elements read from cards or from the IFT, or using descriptions read from cards or from the DFT. The IFMP may be used in conjunction with this program to generate a listing of informational elements organized by access number.
	PLP	The Printed Listing Program is designed to provide printed books, i.e., listings of abstracts, ordered by the contents of the abstracts, i.e., principal author's last name, etc. The printed books produced by PLP are similar to those produced by IFMP, except that the books of the latter are ordered by IFT access number.

*Documents or abstracts of documents not exceeding 50 cards in length

TABLE 1. (continued)

FUNDAMENTAL IR OPERATION	COMPONENT PROGRAM	FUNCTIONS OF COMPONENT PROGRAM
Information Retrieval (Automated Searching)	DFSP	The Description File Searching Program is designed to read requests for particular types of informational elements (stated as sets of key terms) from cards, to search the DFT for relevant informational elements, and to store the access numbers of the most relevant elements on the Question File Tape (QFT).
	DFSPL	The Description File Logical Searching Program is similar to the DFSP except that it is designed to perform logical searches.
Information Retrieval (Automated Retrieval)	IFRP	The Information File Retrieval Program is designed to read requests and access numbers of the relevant informational elements from the QFT, retrieve the corresponding informational elements from the IFT; and print both the requests and the relevant informational elements for the user.

Figure 2. Information Storage, Indexing, and Retrieval in the IM Center



implemented on a Control Data Corporation 3600 at Michigan State University. Now let us turn to a more detailed examination of the automation of the IMC as it has occurred over the past year and a half.

DOCUMENT ACQUISITION AND STORAGE

First let us consider information storage. With the establishment of the IM Center, we placed orders for books, monographs, journals, audiovisual materials, curriculum materials, and related educational equipment apropos to special education.

As a first step for the automation of the library, abstracting procedures had to be devised and uniform rules of entry established for recording of pertinent information on each type of item. An Abstractor's Form Guide[2] was written to convey to our abstracting personnel, primarily graduate students, the type of abstract or description desired.

For retrieval purposes, we prepared one abstract for each acquisition. A book, regardless of the number of pages, is abstracted with an imposed limit of 250 words. In our first year of abstracting, we found only about 10% of our abstractors were truly proficient at this activity. Our best abstractors had backgrounds in psychology and natural science as opposed to those with experience in special education. The average time for the preparation of a quality abstract was found to be about two hours, at a cost of approximately four dollars per abstract.

New material arriving at the IMC is processed and given a unique accession number. This is a single numerical sequence running throughout the collection, each number being preceded by a letter prefix to denote the type of item: AV (audiovisual), CM (curriculum material), D (documents), E (educational equipment), and J (journals). Processing consists of assigning this number on the spine of a book, or for non-book materials, affixing a label at a

conspicuous location on the item. All items are then stored on shelves in numerical order for each type.

After an item is processed and the accession number recorded on the IMC order card, items are held for abstracting and the bibliographic information is punched on cards and stored on magnetic tape, i.e., the Information File Tape (IFT), (see Fig. 3). At this point, abstracts include only immediately available information; indexing terms and descriptive resumes are added later. Entering the essential bibliographic information on the IFT at this early point insures better control of the item for library purposes.

Depending upon abstracting rates, two to three months may elapse before an item is abstracted and entered on the IFT with its descriptors. Procedures for entering information are detailed in the Keypunching Manual[3] devised specifically for this BIRS application. The Keypunching manual presents uniform procedures for recording of corporate entries, abbreviations and punctuation. All items have the same 10-field arrangement for author, title, publisher, etc. as summarized in Table 2 on page 12.

With pertinent information recorded on the IFT, we are free to print such lists as we desire, using the Printed Listing Program (PLP).

In our IMC, these are quarterly updatings of our author, title, and publisher listings as illustrated by Figure 4. Other lists are available, such as by copyright date or even by number of pages. The listing by publisher is especially useful for the librarian when placing an order according to certain publishers or manufacturers. For the purpose of weeding an IMC collection, a PLP by copyright date has certain obvious advantages.

Figure 3. Information Storage Tape (IFT)

Initial IFT Entry

```
550     280     *MEYEN, EDWARD  *SOCIAL ATTITUDE APPROACH TO SEX EDUCATION FOR THE          0550 01
                EDUCABLE MENTALLY RETARDED  *UNIVERSITY OF IOWA SPECIAL EDUCATION          0550 02
                CURRICULUM DEVELOPMENT CENTER  * C NONE  * 294-P.  *CM0550  *MR  *HCY-IMC  0550 03
                *STATUS  ABSTRACT IN PREPARATION                                          0550 04
```

Final IFT Entry

```
550     280     *MEYEN, EDWARD  *SOCIAL ATTITUDE APPROACH TO SEX EDUCATION FOR THE          0550 01
                EDUCABLE MENTALLY RETARDED  *UNIVERSITY OF IOWA SPECIAL EDUCATION          0550 02
                CURRICULUM DEVELOPMENT CENTER  * C NONE  * 294-P.  *CM0550  *MR  *HCY-IMC  0550 03
                *CONTENT SEX EDUCATION FOR MENTALLY RETARDED CHILDREN IS, IN THIS          0550 04
                CURRICULUM GUIDE, PLACED WITHIN A FRAMEWORK OF SOCIAL ATTITUDES AND        0550 05
                VALUES.  ORGANIZED IN A SEQUENTIAL PROGRAM FROM PRE-PRIMARY THROUGH        0550 06
                ADOLESCENCE, THE PROGRAM ATTEMPTS TO PRESENT FACTS AND BASIC CULTURAL      0550 07
                VALUES TO FACILITATE EMOTIONAL DEVELOPMENT AND SOCIAL ADJUSTMENT.          0550 08
                        THE PRE-PRIMARY SECTION CONCENTRATES ON ENCOURAGING A HEALTHY      0550 09
                BODY AND SELF-IMAGE AND RESPECT FOR OTHERS, AND PRESENTS NECESSARY         0550 10
                INFORMATION ON TOILET HABITS, THE GROWTH SEQUENCE, AND MALE AND           0550 11
                FEMALE ROLES.  THE PRIMARY SECTION STRESSES SOCIAL DEVELOPMENT,           0550 12
                PROVIDES SIMPLE FACTS ON HUMAN REPRODUCTION, AND DEALS WITH EMOTIONAL     0550 13
                GROWTH BY POINTING OUT DIFFERENCES IN PEOPLE AND BY PROMOTING             0550 14
                UNDERSTANDING OF NEGATIVE FEELINGS.  THE INTERMEDIATE SECTION             0550 15
                CONTAINS MORE INFORMATION ABOUT EMBRYO AND FETAL DEVELOPMENT,             0550 16
                AND GENERATES DISCUSSIONS ON SOCIAL, EMOTIONAL, AND PHYSICAL              0550 17
                DEVELOPMENT, COVERING MANY PHYSICAL AND EMOTIONAL CHANGES,                0550 18
                PEER RELATIONSHIPS, NEGATIVE BEHAVIOR, AND SEXUAL FEELINGS.               0550 19
                THE ADVANCED SECTION ATTEMPTS TO ENABLE THE ADOLESCENT TO                 0550 20
                COPE WITH THE PROBLEMS OF PUBERTY AND TO PREPARE FOR ADULT LIFE.          0550 21
                DISCUSSIONS FOCUS IN GREATER DETAIL ON PHYSICAL DEVELOPMENT, MEETING      0550 22
                NEEDS, HANDLING EMOTIONS, ADULT RELATIONSHIPS, AND MARRIAGE AND FAMILY    0550 23
                LIVING.  THE AIM THROUGHOUT IS TO PRESENT A UNIFIED AND COMPREHENSIVE     0550 24
                CONCEPT OF DEVELOPMENT SHOWING THE INTERRELATIONSHIP OF PHYSICAL,         0550 25
                EMOTIONAL, AND SOCIAL GROWTH, WITHIN AN ATMOSPHERE ENCOURAGING FREEDOM    0550 26
                TO EXPLORE AND ASK QUESTIONS YET STRESSING SOCIAL RESPONSIBILITY AND       0550 27
                ATTITUDES THROUGH THE ADULT MODEL.                                        0550 28
```

Figure 4. Printed Listings

Author PLP

KEYWORD	ABSTRACT FIELD		CONTEXT
BOWER	00344	01	*BOWER, ELI M. *A PROCESS FOR EARLY IDENTIFICATION OF EMOTIONALLY DISTURBED CHILDREN *CALIFORNIA STATE DEPT. OF EDUCATION * C 1958 * 111-P. *D0344 *ED *HCY-IMC
BOWLEY	00220	01	*BOWLEY, AGATHA H. *THE YOUNG HANDICAPPED CHILD EDUCATIONAL GUIDANCE FOR THE YOUNG BLIND, CEREBRAL PALSIED, AND DEAF CHILD *WILLIAMS AND WILKINS * C 1957 * 127-P. *D0220 *SE *HCY-IMC
BRANCH	00545	01	*BRANCH, MARGARET *GIFTED CHILDREN - RECOGNIZING + DEVELOPING EXCEPTIONAL CHILDREN *INTERNATIONAL PUBLIC SERVICE * C 1966 * 222-P. *D0545 *GC *HCY-IMC *STATUS ABSTRACT IN PREPARATION

Title PLP

KEYWORD	ABSTRACT FIELD		CONTEXT
ABSORBENT	01310	02	*MONTESSORI, MARIA *THE ABSORBENT MIND *HOLT * C 1967 * 320-P. *D1310 *SE *HCY-IMC *STATUS ABSTRACT IN PREPARATION
ABSTRACT	00033	02	*RUBIN *ABSTRACT FUNCTIONING IN THE BLIND *AMERICAN FOUNDATION FOR THE BLIND *CFEB. 1964 *64-P. *D0033 *VH *HCY-IMC
ACCIDENT	00455	02	*SCHULZINGER, MORRIS S. *THE ACCIDENT SYNDROME THE GENESIS OF ACCIDENTAL INJURY A CLINICAL APPROACH *THOMAS * C 1956 * 234-P. *D0455 *CH *HCY-IMC

TABLE 2. Format of Standardized Bibliographical Entry for Abstracts

	AUDIO-VISUAL	CURRICULUM MATERIALS	DOCUMENTS	EQUIPMENT	JOURNALS
Field 1	Author	Author	Author	None	Author
Field 2	Title	Title	Title	Item name	Title
Field 3	Source	Source	Source	Source	Name of Journal
Field 4	Copy. date	Copy. date	Copy. date	Year	Issue date
Field 5	Price	# of pages	# of pages	Price	# of pages
Field 6	Number	Number	Number	Number	Number
Field 7	Category	Category	Category	Category	Category
Field 8	HCY-IMC	HCY-IMC	HCY-IMC	HCY-IMC	HCY-IMC
Field 9	Content	Content	Content	Content	Content
Field 10	Descriptors	Descriptors	Descriptors	Descriptors	Descriptors

COMPUTER AIDED INDEXING

Having concluded our examination of information storage, let us consider the matter of information indexing.

We first attempted to use the ERIC Thesaurus for automated indexing. This was not a feasible method for two reasons. First, the thesaurus was too large for core memory. Second, many of the thesaurus terms were irrelevant to the materials in the IM Center collection. We then began a search for alternate methods of machine indexing. The ERIC Thesaurus is composed of terms selected *a priori* and then applied to a body of literature. We proposed to attack the problem from the opposite direction. Our terms were selected from the literature itself and then applied. This seemed to insure that we would be indexing using the same terms that were contained in the literature.

To arrive at our original list of thesaurus terms, we used the Descriptive Analysis Program (DAP) to prepare a concordance with word frequencies for our entire file of abstracts. A sample output is shown in Figure 5.

Figure 5. Concordance with Word Frequencies for Content Analysis

KEYWORD	ABSTRACT FIELD DUPS. CONTEXT
BILATERAL	00113(CONTENT).
BILLION	00062(CONTENT).
BINAURAL	00069(CONTENT).
BINET	00048(CONTENT).
BINOCULAR	00106(CONTENT), 00116(CONTENT), 00140(CONTENT.2).
BIOCHEMICAL	00119(CONTENT).
BIOCHEMISTRY	00227(CONTENT).
BIOELECTRICAL	00197(CONTENT).
BIOGRAPHICAL	00041(CONTENT), 00112(CONTENT).
BIOGRAPHIES	00215(CONTENT).
BIOGRAPHY	00040(CONTENT), 00062(CONTENT), 00123(CONTENT).
BIOLOGICAL	00041(CONTENT), 00107(CONTENT), 00137(CONTENT).
BIOLOGIST	00134(CONTENT).
BIOPHYSICAL	00068(CONTENT).
BIOSOCIAL	00198(CONTENT).

Next, a careful selection was made of those words of relevant content which were mentioned most frequently. This operation netted a thesaurus with approximately 300 primary words with pertinent synonyms.

We devised three methods for choosing descriptors, from pure computer-aided indexing to complete manual selection of terms. The 3 criteria were vocabulary control, efficiency in cost of indexing, and effectiveness of searching.

Method #1 was automated indexing using our standard thesaurus of terms which contains pertinent curricular area, disability area, and grade level descriptors as a standard-include list. This insures complete control over the vocabulary of terms being utilized. Computer time cost was $.30 per abstract indexed, with about 25 descriptors found per abstract. After we

added nearly 100 more new manually selected terms to our standard-include, we obtained 90% of the pertinent descriptors normally selected by human indexers.

Method #2 was a manually produced DFT wherein indexers were asked to note any words they felt would make good descriptors, whether included in the abstract text or not. Cost involved for this operation was about $.50 per abstract. No vocabulary control was exercised. After compiling the indexers' lists, it was apparent there is wide variance of opinion in what constitutes a good descriptor. As many as 40 words were chosen, with perhaps only 10 mentioned more than three or four times. In view of the time involved, computer-aided indexing techniques could delineate the same words as was the case in method 1.

Method #3 was an automated indexing method using a standard set of exclude terms, as contrasted to the first automated method which used a set of include terms. No meaningful vocabulary control is exercised at this time, since only syntactic words such as "a," "an," and "the" are excluded. In time, this may become as viable a method as method #1, particularly if the decision is to construct a thesaurus to exclude rather than include terms. The most obvious problem at present is that all words not excluded will naturally be included as descriptors. In some instances, 75 possible descriptors were selected for a single abstract! This method was comparable to method #1 in computer time, but involved going through the DAP output to determine which terms were the best 32 descriptors. (Presently, we have an arbitrary limit of 32 descriptor terms for automated question-and-answer systems.)

Of the three methods, method #1 has consistently provided the best answers in terms of vocabulary control as well as over all efficiency. Since this method selects 90% of the pertinent descriptors, we feel that further analysis

at this time is not worth the effort expended. Retrieving pertinent answers seems not to have been significantly affected by this decision.

COMPUTER PRODUCTION OF ABSTRACT CATALOGS

The production of library catalogs is an integral part of descriptor assigning activity. The Printed Indexing Program (PIP) was used to prepare key-word term entry indexes for catalogs. Before producing any catalogs, we had to first decide upon the form in which they were to be printed. This has not been a matter of concern in traditional libraries since only one choice is available: the card catalog, which has obvious physical as well as cost limitations.

We have studied two formats for printed subject indexes, a KWIC and a KWOC (see Figure 6) and have given users a chance to react to both. The most popular has been the KWIC format which affords more information from its printing of the line from the abstract from which the term was taken. While differing in physical appearance, both indexes have the same information. This figure also illustrates the use of indexes for abstract location.

In the IMC all indexes are combined and bound along with a full printout of the IFT. With the index and abstracts enclosed in the same binder, a reader can search out the most likely items and, while still seated, read an abstract of it instead of losing valuable time searching for the item on a shelf in order to peruse the contents. After reading the pertinent abstracts and deciding which items are most appropriate, a search is made of the shelves, where the items are arranged in numerical order by accession number. This accession number listing obviates the need for a classification scheme since an item can be recalled under many headings. In the present system, an item may appear under unlimited headings for printed indexes. This is an improvement over the possibilities offered by traditional libraries, which have, on the average, only 4-6 headings for each item.

Figure 6. Printed Catalog of Abstracts with Main Types of Indexes

KWOC Type Index

AMERICAN	00011, 00018, 00036, 00086.
ANALYSIS	00004, 00012, 00014, 00046, 00048, 00060, 00082.
ANATOMICAL	00078.
ANATOMY	00052, 00053, 00054.
ANTHROPOLOGY	00041.
APHASIA	00057.
APPENDIX	00071.

KWIC Type Index

KEYWORD	ABSTRACT	FIELD	DUPS.	CONTEXT	
ACTIVITY	00012	CONTENT		CATEGORIES, HOWEVER, THERE ARE 2 TYPES OF ACTIVITY CATEGORIES LISTED	0012 10
	00080	CONTENT		BULK OF THE BOOK DEALS WITH THE IDEA OF AN ACTIVITY PROGRAM AND THE	0080 11
	00113	CONTENT		ACTIVITY, AND THE PERIPHERAL AND CENTRAL EXPLANATION OF ACUITY. IN	0113 11
	00119	CONTENT		ACTIVITY OF THE RETINA PROVIDED THE AUTHORS WITH THE PHYSIOLOGICAL BASIS	0119 11

Abstract Listing

12 220 *GRAHAM *SOCIAL RESEARCH ON BLINDNESS *AMERICAN FOUNDATION FOR THE BLIND *C1960 *177-P *D0012 *VH *HCY-IMC 0012 01
*CONTENT THIS IS A SURVEY OF RESEARCH PROJECTS 0012 02
AND PUBLICATIONS CATEGORIZED AND ANALYZED IN ORDER TO MAKE THESE 0012 03
MATERIALS MORE MEANINGFUL TO RESEARCH WORKERS. IT WAS ORGANIZED INTO 5 0012 04
CONTENT CATEGORIES A) GENERAL SOCIAL RESEARCH ON BLINDNESS B) THE ADULT 0012 05
BLIND (VOCATIONAL AND PERSONAL REORGANIZATION, BLINDED VETERANS AND AGED 0012 06
C) THE BLIND YOUNG D) THE DEAF-BLIND AND E) PSYCHOLOGICAL MEASUREMENT. 0012 07
THERE IS AN UNAVOIDABLE OVERLAP AMONG SOME OF THE CATEGORIES, HOWEVER 0012 08
THERE ARE 2 TYPES OF ACTIVITY CATEGORIES LISTED ALSO, WHICH ARE USED TO 0012 09
FURTHER DESCRIBE THE 5 CONTENT CATEGORIES INTO PROJECTS AND PUBLICATIONS. 0012 10
EACH CATEGORY BEGINS WITH A GENERAL DESCRIPTION AND ANALYSIS OF THE 0012 11
AREA - THIS IS FOLLOWED BY THE RESEARCH PROJECTS DESCRIBED WITH - TITLE, 0012 12
PURPOSE, INVESTIGATOR, CONDUCTED BY, AND DURATION. THE PUBLICATIONS ARE 0012 13
THEN LISTED IN THE BIBLIOGRAPHIES. SOME ADDITIONAL FACTS ARE - 71 PER 0012 14
CENT OF THE RESEARCH PUBLICATIONS WERE PUBLISHED SINCE 1953 - ONE-HALF 0012 15
THE CURRENT RESEARCH PROJECTS PERTAIN TO THE YOUNG BLIND - ARTICLES 0012 16
CONSTITUTE 60 PER CENT OF ALL THE ITEMS - DISSERTATIONS ARE MOST COMMON 0012 17
ON PROBLEMS OF VOCATIONAL AND PERSONAL REORGANIZATION WHILE LEAST 0012 18
COMMON ON DEAF-BLINDNESS. THERE ARE A TOTAL OF 151 RESEARCH PROJECTS AND 0012 19
508 PUBLICATIONS. 0012 20

AUTOMATED SEARCHING

To complete our examination of the IM Center, let us discuss automated searching. While our printed indexes constitute one major form of printout, the other major form is the Automated Question and Answer system. This system utilizes the DFT that has been designed to store up to 32 descriptors per abstract.

In the MSU/IMC, patrons seeking a computer search are asked to write down the terms about which they desire information on the Question and Answer Form. Synonyms previously incorporated into the thesaurus dispense with many of the language problems encountered in asking questions. For example: a request is made for information on sex education for mentally retarded children. The Description File Search Program (DFSP) examines the DFT for relevant abstracts and stores their access numbers on the Question File Tape (QFT).

The Information File Retrieval Program (IFRP) reads the requests and access numbers from the QFT, retrieves the corresponding abstracts from the IFT, and prints both the request and abstracts for the user, as illustrated in Figure 7. While our example contained only four terms, it could have been increased to 32 terms, to further specify the user's information needs. Two methods of searching are used by BIRS programs.

Relevance searching is based upon the calculation of similarity coefficients between abstracts and question. This method is designed for use by inexperienced users. Logical searching is based upon the traditional method of Boolian search, with terms and logical operators. Logical searching is used by more experienced individuals.

Costs for the foregoing systems are best expressed in terms of dollar costs per hundred abstracts. The average for printed indexes in $20 per hundred. The average cost for searching is about $.25 per question, per hundred abstracts.

Figure 7. Sample Question and Answer for Automated Searching

SEARCHING METHOD.

METHOD OF CALCULATING RELEVANCE INDEX = LOGICAL
MINIMUM RELEVANCE INDEX USED FOR RETRIEVAL = 1.000
MAXIMUM NUMBER OF ANSWERS REQUESTED = 10

QUESTION TEXT

SEX.AND.EDUCABLE.AND.RETARDED.AND.EDUCATION

ABSTRACT NO. 550 WORD COUNT 280 RELEVANCE INDEX 1.000

*MEYEN, EDWARD *SOCIAL ATTITUDE APPROACH TO SEX EDUCATION FOR THE EDUCABLE MENTALLY RETARDED *UNIVERSITY OF IOWA SPECIAL EDUCATION CURRICULUM DEVELOPMENT CENTER *C NONE * 294-P *CM0550 *MR *HCY-IMC *CONTENT SEX EDUCATION FOR MENTALLY RETARDED CHILDREN IS, IN THIS CURRICULUM GUIDE, PLACED WITHIN A FRAMEWORK OF SOCIAL ATTITUDES AND VALUES. ORGANIZED IN A SEQUENTIAL PROGRAM FROM PRE-PRIMARY THROUGH ADOLESCENCE, THE PROGRAM ATTEMPTS TO PRESENT FACTS AND BASIC CULTURAL VALUES TO FACILITATE EMOTIONAL DEVELOPMENT AND SOCIAL ADJUSTMENT.

THE PRE-PRIMARY SECTION CONCENTRATES ON ENCOURAGING A HEALTHY BODY AND SELF-IMAGE AND RESPECT FOR OTHERS, AND PRESENTS NECESSARY INFORMATION ON TOILET HABITS, THE GROWTH SEQUENCE, AND MALE AND FEMALE ROLES. THE PRIMARY SECTION STRESSES SOCIAL DEVELOPMENT, PROVIDES SIMPLE FACTS ON HUMAN REPRODUCTION, AND DEALS WITH EMOTIONAL GROWTH BY POINTING OUT DIFFERENCES IN PEOPLE AND BY PROMOTING UNDERSTANDING OF NEGATIVE FEELINGS. THE INTERMEDIATE SECTION CONTAINS MORE INFORMATION ABOUT EMBRYO AND FETAL DEVELOPMENT, AND GENERATES DISCUSSIONS ON SOCIAL, EMOTIONAL, AND PHYSICAL DEVELOPMENT, COVERING MANY PHYSICAL AND EMOTIONAL CHANGES, PEER RELATIONSHIPS, NEGATIVE BEHAVIOR, AND SEXUAL FEELINGS. THE ADVANCED SECTION ATTEMPTS TO ENABLE THE ADOLESCENT TO COPE WITH THE PROBLEMS OF PUBERTY AND TO PREPARE FOR ADULT LIFE. DISCUSSIONS FOCUS IN GREATER DETAIL ON PHYSICAL DEVELOPMENT, MEETING NEEDS, HANDLING EMOTIONS, ADULT RELATIONSHIPS, AND MARRIAGE AND FAMILY LIVING. THE AIM THROUGHOUT IS TO PRESENT A UNIFIED AND COMPREHENSIVE CONCEPT OF DEVELOPMENT SHOWING THE INTERRELATIONSHIP OF PHYSICAL, EMOTIONAL, AND SOCIAL GROWTH, WITHIN AN ATMOSPHERE ENCOURAGING FREEDOM TO EXPLORE AND ASK QUESTIONS YET STRESSING SOCIAL RESPONSIBILITY AND ATTITUDES THROUGH THE ADULT MODEL.

Personnel directly related to the IR operations are the librarian, secretary, data processor, and keypunch operator. The latter two spend all of their time with the IR system, while the librarian and secretary devote only half their time under normal circumstances. All work is directed by the librarian; the data processor is responsible for making runs on the computer, proofreading cards and maintaining files.

In conclusion we have presented a case study of the automation of one regional library using methods appropriate to library networks. This method of library automation retains local initiative and direction of operations, while at the same time allowing for the integration of local centers into a larger library system. By combining regional libraries, a suitable growth pattern can be established on a local basis. Using standardized procedures for bibliographic entry and computer applications, all libraries are able to draw upon the resources of the others. No local center has been forced into a single uniform mold. Instead, each center has begun with locally based operations, and is now growing into a national information system for special education.

We have experienced many problems, but none that cannot be solved through cooperation and standardization. The integrated teamwork of the librarian, data processor, computer programmer, and computer laboratory operators is imperative to the success of the program. Intra-center cooperation and effort cannot be stressed enough, since failure to communicate mutual ideas and plans at any point in the professional line-up will result in wasted effort, duplication and non-realization of intended goals.

The most vexing problem has been in the production of multiple copies of our printed catalogs, which can number several hundred pages. This large-scale output has not been popular with the personnel in our university computer

facility, and an IMC cannot exist without multiple copies of its catalogs. However, university computer centers tend to be oriented to the small user with perhaps two to three minutes of computer time and an output of a like number of pages. While we are not tying up high-speed computers for inordinate lengths of time, existing output devices are being taxed to the limit. The difficulty lies with equipment that cannot handle the heavy demand and with antiquated operating rules and regulations of computing facilities. We feel that many facilities are retarding the development of computerized library techniques by not solving the output problem of multiple copies.

Another problem relates to the automated searching. Universities seem reluctant to spend sufficient funds to obtain the necessary time-shared facility for conversational searching and retrieval. In general, we have been more troubled by short-sighted administrative policies than by technical difficulties. If this continues to be the case, many automated libraries will be better off with their own computing facilities.

REFERENCES

1. J. Jordan, Editor, "ERIC Excerpt," Exceptional Children, vol. 34, no. 2, pp. 143-148 (1967).

2. C.F. Oldsen, "Abstractor's Form Guide," Technical Papers of the Center, #1, IMC Handicapped Children and Youth, Michigan State University, (October, 1967).

3. C.F. Oldsen and L. Spagnuolo, "Keypunching Manual," Technical Papers of the Center, #2, IMC Handicapped Children and Youth, Michigan State University, (December, 1967).

FIGURES

Figure 1. Major Networks of Educational Regional Libraries . . . 3

Figure 2. Information Storage, Indexing, and Retrieval in the IM Center 7

Figure 3. Information Storage Tape (IFT) 10

Figure 4. Printed Listings 11

Figure 5. Concordance with Word Frequencies for Content Analysis 15

Figure 6. Printed Catalog of Abstracts with Main Types of Indexes 16

Figure 7. Sample Question and Answer for Automated Searching . . 18

TABLES

Table 1. Component Programs of the Basic Indexing and Retrieval System (BIRS 2.0) 5

Table 2. Format of Standardized Bibliographical Entry for Abstracts 12